

**CLAIMS**

1. A method for treating anemia in a patient in need thereof, the method comprising,  
administering to said patient, a vector comprising a nucleic acid sequence encoding  
erythropoietin (Epo) in operable linkage with an HRE expression control sequence,  
5 wherein expression of Epo is physiologically regulated such that hematocrit levels  
of said patient are corrected and maintained.
2. The method of claim 1, wherein the vector is a viral vector.
3. The method of claim 2, wherein the viral vector is an adeno-associated viral vector.
4. The method of claim 1, wherein the HRE expression control sequence is an Epo  
10 HRE expression control sequence.
5. The method of claim 1, wherein the HRE expression control sequence is a PGK-1  
HRE expression control sequence.
6. The method of claim 1, wherein the HRE expression control sequence is a LDH-A  
HRE expression control sequence.
- 15 7. The method of claim 1, wherein the HRE expression control sequence is in operable  
linkage with a promoter.
8. The method of claim 7, wherein the promoter is a viral promoter.
9. The method of claim 8, wherein the viral promoter is the CMV promoter.
10. The method of claim 1, wherein the HRE expression control sequence includes two  
20 or more HRE expression control sequences.
11. The method of claim 10 wherein the HRE expression control sequence is a PGK-1  
HRE expression control sequence.
12. The method of claim 1 wherein the patient is a human.
13. The method of claim 1 wherein the patient is a non-human mammal.

14. The method of claim 13 wherein the patient is a canine, feline, bovine, equine, ovine, porcine or non-human primate.
15. A vector system comprising a nucleic acid sequence encoding erythropoietin (Epo) in operable linkage with an HRE expression control sequence, wherein the HRE expression control sequence includes two or more HRE expression control sequences; and, the vector system, when administered to a host, provides for physiological regulation of Epo.
16. The vector system of claim 15, wherein the vector is a viral vector.
17. The vector system of claim 16, wherein the viral vector is an adeno-associated viral vector.
18. The vector system of claim 15, wherein the HRE expression control sequence is an Epo HRE expression control sequence.
19. The vector system of claim 15, wherein the HRE expression control sequence is a PGK-1 HRE expression control sequence.
20. The vector system of claim 15, wherein the HRE expression control sequence is a LDH-A HRE expression control sequence.
21. The vector system of claim 15, wherein the HRE expression control sequence is in operable linkage with a promoter.
22. The vector system of claim 21, wherein the promoter is a viral promoter.
23. The vector system of claim 22, wherein the viral promoter is the CMV promoter.